

Tech Tip 18

Consistent Color Reproduction

Process color printed by flexography can rival offset lithography and gravure if proper equipment is used and careful attention is paid to detail. This Tech Bulletin reviews key factors that affect color reproduction and suggests an approach to improving reproduction consistency.

Printing Substrate

Substrate characteristics must be consistent throughout the press run if color reproduction is to be consistent. Many flexographers who print process color develop their own acceptance specifications for substrates. These may include:

Paper

Color, smoothness, gloss and absorption gives a measure of paper surface efficiency, or P.S.E., the most useful index of how well a particular substrate will reproduce process color. Do not mix substrate from different lot numbers during a job.

Plastic Film and Foil

For plastic film, use of smoothness and gloss specifications is recommended. For coated stocks, coating continuity and coating adhesion are appropriate. Surface treatment should be checked on most polyolefin films. Aluminum foils should be evaluated for surface contamination.

Printing Plates

Flexographic printing plates have a major effect on the printed ink film thickness and reproduction quality. The type of plate material is important. Natural rubber plates have an excellent affinity for water- and alcohol-type inks.

Most MacDermid photopolymer plates release ink better than natural rubber. As a result, photopolymer plates run cleaner, picking up less ink and transferring it more completely. Vinyl-nitrile plates offer ink transfer characteristics more like photopolymers than natural rubber.



The durometer (hardness) of the plate also affects ink transfer. Natural rubber and MPS plates used for printing flexible packaging are typically 45-55 Shore A hardness. Lower durometer plates can offer improved ink coverage on rough surfaces such as corrugated board. All plates mounted on one cylinder should be of the same durometer to ensure consistent inking.

Compressible mounting materials have little effect on printed ink film thickness, but can have a major, beneficial effect on the sharpness of the printed image.

Press Ink Metering Systems

The ink metering system plays a key role in controlling printed ink film thickness and consistency. The cell shape and cell count of the anilox roll is the most important elements in the inking system. The surface finish of the anilox roll will also affect ink transfer. Remember, as the mechanically etched anilox roll wears and the ceramic anilox roll fills in, the cell volume decreases. This is why many printers number anilox rolls and keep track of the number of impressions printed by each roll. We recommend this practice.

Reverse angle doctor blades allow the most precise metering of the ink film and are least affected by changes in press speed. Two-roll ink metering systems tend to deliver more ink as press speed increases. This can cause excessive ink laydown, or fill-in of the printed image.

Inks

If consistent color reproduction is to be maintained, ink must have uniform color strength and viscosity. Color strength is most often measured in the pressroom using a reflection densitometer. Viscosity is measured by an efflux cup, such as a Zahn or Shell cup. The procedures for measuring ink density and viscosity are discussed in detail in Tech Bulletins 16 and [17](#). Changing ink lot numbers during a press run can result in a shift in color.

Record Keeping

If you want to control the factors that affect consistent color reproduction, you must measure and record those factors for each press run. We recommend the use of a standardized form for all jobs, such as the MPS Consistent Color Control form reproduced here.



MPS Consistent Color Chart

Job Description	Substrate	Plate Material	Printing Press			
Design:	Type:	Type:	Press No.:			
Job No.:	Supplier:	Durometer:	Average Speed:			
Date:	Lot No.:	Thickness:	No. of impressions:			
	P.S.E.:	Mounting Type:				
Ink and Ink Metering						
	Station					
	1	2	3	4	5	6
Aniliox Roll						
Cell count/shape						
Roll No.						
Metering						
Doctor blade/2-roll						
Ink						
Color, name and No.						
Supplier						
Lot No.						
Viscosity, seconds						
Reducing solvents						
Reflection density						
pH						

